DOCUMENT RESUME

ED 106 212 SO 008 359

TITLE	A Framework for Educational Indicators to Guide Government Decisions.
INSTITUTION	Organisation for Economic Cooperation and Development, Paris (France).
PUB DATE	Apr 73
NOTE	21p.; Some pages may be of marginal legibility; Best Copy Available
EDRS PRICE	MF-$0.76 HC-$1.58 PLUS POSTAGE
DESCRIPTORS	*Comparative Education; Design Preferences; *Educational Objectives; Educational Planning; Educational Policy; Factor Analysis; *Guidelines; Management by Objectives; Measurement Instruments; *Policy Formation; Political Science; Social Characteristics; *Social Environment; Social Studies; Socioeconomic Influences
IDENTIFIERS	*Social Indicators

ABSTRACT

Mainly dealing with proposals concerning indicators for measuring the impact of education on society, this report attempts to present a framework of educational statistics related to the main policy concerns of member countries. Indicators are assessments of the condition of society vis-a-vis its aspirations and goals. The report defines some of the more important general policy objectives and examines statistical measures that are most useful to monitor progress or regression within each area of concern. This approach accepts that indicators of performance must be multi-dimensional so that education can meet its many objectives including contributions to the transmission of knowledge, equality of opportunity and social mobility, meeting the needs of the economy, individual development, and transmission and evolution of values. Finally, the effective use of resources in pursuit of the policy objectives is discussed. (Author/ND)

ED106212

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A FRAMEWORK FOR EDUCATIONAL INDICATORS TO GUIDE GOVERNMENT DECISIONS

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ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

PARIS - APRIL 1973

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March 1973

The attached report, which to a large extent deals with proposals concerning indicators for measuring the impact of education on society, embodies the conclusions and recommendations of the Education Committee's Working Group on Educational Statistics and Indicators as endorsed by the Committee itself. Originally circulated as a restricted document under reference ED(72)16, it has been derestricted by decision of the Council on the recommendation of the Education Committee.

The decision to derestrict the present document was taken on February 13, 1973.

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A FRAMEWORK FOR EDUCATIONAL INDICATORS TO GUIDE GOVERNMENT DECISIONS

Introduction

1. This paper attempts to present a framework of educational statistics related to the main policy concerns of Member countries. The intention is not to prescribe a definitive list of statistics appropriate for all Member countries, but simply to suggest the kind of indicator which seems likely to prove generally useful (1). The present emphasis on a statistical framework attempting to portray the common concerns of Member countries in the field of education is partly a response to the new interest which governments have shown in a more rational and explicit method of accounting in the public sector (2) - partly to the general feeling since the widespread student disturbances of 1968 that social goals need re-examination, partly to the express request of Member countries that the Secretariat should elaborate a set of social indicators for society in general and within the educational sector as concluded by the Conference on Policies for Educational Growth (3).

2. This paper is to a large extent concerned with measuring the impact of education on society. Hitherto, the main effort in developing measures of educational progress has been to portray achievement, i.e. factual knowledge and cognitive and to a lesser extent affective aspects. The main argument for concentrating on these "internal" measures was that to measure the impact of education on society would involve taking account of a host of other factors and leave us, at best, with a very crude picture. But such "internal" measures do not anymore than other measures reflect the impact of education alone. The Coleman report (4) demonstrated that these so-called internal measures are strongly related to societal influences. The educational system is extremely open and one cannot distinguish neatly between the influence of education proper and the social structure as a whole without a detailed and painstaking analysis.

(1) For an earlier effort to provide a comprehensive statistical framework for education statistics (without explicit reference to policy concerns), see: Methods and Statistical Needs for Educational Planning, OECD, Paris, 1967. See also R. Stone, Demographic Accounting and Model-Building, OECD, Paris 1971, and A System of Demographic and Social Statistics and its Links with the System of National Economic Accounts (E/CN.3/432) U.N., New York, 3rd April 1972 (also prepared by Professor Stone).

(2) See Commissariat General au Plan, Recherches sur les indicateurs sociaux, S.E.D.E.I.S., Paris, 1971 ; Economic Council of Canada, Design for Decision-Making, Ottawa, September 1971 ; Towards a Social Report, U.S. Department of Health, Education and Welfare, Washington D.C., 1969.

(3) See Educational Policies for the 1970's, OECD, Paris 1971.

(4) J.S. Coleman and Associates, Equality of Educational Opportunity, U.S. Department of Health, Education and Welfare, Washington D.C., 1967.

3. In preparing this paper the Working Group was influenced by the recent discussions on social indicators. There are in principle two opposite views as to the definition of social indicators. On the one hand there are those who consider that relevant measures should refer to welfare and consequently concentrate only on measures of output or result (1). On the other hand there are those who want to extend the depth of social reporting into areas where the distinction between input and output has no meaning e.g. the assessment of the condition of society vis-à-vis its aspirations and goals. In this latter case the definitional criterion for a social indicator is "membership in a social-system model as a parameter or variable"(2). The Working Group has preferred to use the term "indicator" in the latter sense as it is extremely difficult, and in many instances meaningless, to distinguish between ends and means, inputs and outputs in a system like education.

4. In discussing the framework of analysis for education it should be remembered that measurement in itself introduces a special type of uncertainty. People are influenced in their behaviour patterns because these are undergoing measurement, and this effect cannot be identified.

5. The Working Group has not undertaken a systematic analysis of a general model of the educational system and its interaction with society and between its different parts. What the Group has tried to do is to distil from existing national policy statements some areas of apparently general concern to governments in Member countries. There is no attempt to be exhaustive in the coverage of areas of concern. Here we have only set ourselves the modest objective of defining some of the more important general policy concerns and to examine which statistical measures are most useful to monitor progress or regression within each area of concern. In the following sections the approach of the Group is to accept that education serves many objectives and that indicators of performance must be multi-dimensional. But for the sake of simplicity of exposition it is necessary to reduce the number of dimensions as far as possible. The facets specified are tentative and pragmatic categories subject to amendment and discussion and should not be regarded as rigorous and definitive.

I. Contribution of Education to the Transmission of Knowledge (3)

6. Two different aspects of concern will be considered :

(1) Towards a Social Report, U.S. Department of Health, Education and Welfare, Washington D.C. 1969.

(2) K.C. Land, "Social Indicators" in Social Science Methods, Free Press, New York, 1970.

(3) Reference to advancement of knowledge has been omitted because of the vastness of the field and the (at present) unsolved problems of actually measuring advancement in knowledge.

(a) number of persons participating in the educational process ;

(b) knowledge and skills transmitted to each person during the educational process.

7. Relevant indicators under (a) are :

(i) Number and proportion enrolled by each year of age and by sex, for each level and type of education (1).

(ii) Stock of people, not in formal school system, by type, level and years of education completed, by age and sex (2).

(iii) Number and proportion in each year of age by sex who complete each level and type of education, and number and proportion who leave the school system without having graduated by years and type of education attained (3).

(iv) Changes in stock of people who have graduated by type and level of education, and by number of years and type of education completed, by age and sex.

8. For all these indicators, a breakdown is needed both by graduation and years of education completed, since it is clear that education received by "drop-outs" must be included in the output concept and cannot be ignored as if it were 100 per cent wastage. Information on (i) and (iii) will be needed annually, while for (ii) and (iv), it is probably sufficient to get a complete picture every five or ten years as the information becomes available from census reports (4).

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(1) It is assumed that type and level of education contain as sub-classifications private/public education and full-time/part-time education.

(2) In addition to age and sex a classification by number of years of gainful employment might also be useful in connection with (i) and (ii) to assess the extent of on-the-job training and knowledge obtained through vocational experience. Ad hoc studies would be sufficiently illustrative.

(3) As the term graduate is not always precise and clear this indicator presents some technical difficulties which cannot be discussed in this paper.

(4) See Flows within the Educational System and Entry into the Labour Force, Educational Matrix, Netherlands Central Bureau of Statistics, 1969, for a presentation of the data needed to construct indicators (i) and (iii).

9. As indicators of knowledge and skills transmitted, the following are worth consideration:

(v) achievement scores (of people undergoing education) measuring factual knowledge by age, sex, number of years and type of schooling, and relevant socio-economic characteristics. Examples of such achievement scores are those used in the Swedish I.E.A. study (1) or those used by the National Assessment of Educational Progress in the United States (2). In addition to their obvious usefulness as basic data for educational policy in each country, these indicators can, as demonstrated by the I.E.A. study, also be used for international comparison.

10. Indicators of factual knowledge are however insufficient. More general measures have been discussed in the literature, such as the impact of schooling on cognitive and affective characteristics of individuals (3). By cognitive characteristics is meant characteristics describing an individual's capacity for logical thinking, while by affective characteristics are meant characteristics describing a person's motivational and emotional patterns.

11. A more direct measure of the social impact of learning is however:

(vi) basic ability to communicate by age, sex and relevant socio-economic characteristics. There are considerable definitional problems attached to this indicator, and special difficulties in inter-country comparability. The essential purpose is to test capacity to function effectively in modern society, and provide an independent test of the quality and relevance of education in meeting present social needs. The actual measure need not encompass this concept in its entirety, but should have a close correlation with most important dimensions of the concept. In the Swedish Report on Low Incomes (4) the concept has been operationalised by the question: "Would you be able to write a formal complaint about a decision made by an official authority ?" One difficulty with such an indicator is that performance in the test does not depend entirely on formal education. Nevertheless, low performance in the test may point

(1) See T. Husén, ed., International Study of Achievement in Mathematics, I and II, Wiley, New York, 1967.

(2) Proceedings of the Invitational Conference on Testing Problems, Educational Testing Service, New York, 1971.

(3) For an example of an analysis of these characteristics, see H. Gintis; "Education, Technology and the Characteristics of Worker Productivity", American Economic Review, Papers and Proceedings, May, 1971.

(4) Låginnkomstutredningen, Innriksdepartementet, Stockholm, 1970. Less satisfactory measures are those apparently used by the U.S. Bureau of the Census which uses fifth grade educational attainment as a proxy for functional literacy, or the U.S. Office of Education which uses eight grade educational attainment as its criterion. See Notes on the Future of Education, Spring 1971, Syracuse University.

to the need for improvements in formal education. This indicator is essentially a stock measure, and since the average ability to communicate changes rather slowly, information will probably only be needed every five or ten years.

II. Contribution of education to equality of opportunity and social mobility

12. Most countries consider equality of opportunity to be an important policy objective in education and recent research has suggested that progress towards this goal has fallen far short of expectations (1). Three dimensions of this concept can probably be distinguished which can be considered as separate objectives in their own right or as successive stages of democratisation:

(a) formal equality of access, where an attempt is made to reduce group disparities (indicators vii and viii);

(b) equality of educational resource input by social group and availability of compensatory finance to achieve equality of opportunity to finance study (indicators ix and x);

(c) equality of educational achievement when performance is compared between social groups, regions, and sex (indicator xi).

13. The concept of "socio-economic characteristics" used below is very important in connection with any discussion on equality of opportunity. It is therefore useful to explain its meaning immediately. This concept has three usual dimensions, i.e. income of parents, education of one or both of the parents and social class or race of parents. It is not always possible to define socio-economic characteristics very precisely. Many different socio-economic indices are possible, with different combinations of variables like occupation, income, wealth, housing standards, standard of neighbourhood, education, etc. Classification by each of these variables results in considerable differences in measures of welfare and almost all attitudes and/or behavioural variables. On the macro level all these variables seem to be good substitutes for each other in the sense that whichever of these are used in practice, the result is the same. There is however a need for greater rigour in this field in order to ensure that measures of social origin used in education are comparable with those used to measure stratification in the population as a whole. There is

(1) See J.S. Coleman and Associates, Op. cit.; T. Husén, Talent, Opportunity and Career, Almquist and Wiksell, Stockholm, 1969; P.M. Blau and O.D. Duncan, The American Occupational Structure, Wiley, New York, 1967 and Conference on Policies for Educational Growth, Education Growth, Education and Distribution of Income, and Group Disparities in Educational Participation and Achievement, OECD, Paris, 1971.

always the danger in elitist systems that student response to general questionnaires on social origin will be biased upwards as compared to parental response in an anonymous census exercise.

14. The following indicators seem necessary in order to help clarify the degree to which education systems promote equality of opportunity and achievement and social mobility. Some of the data they contain have already been mentioned under other headings, the essential problem here is to cross-classify the information by socio-economic characteristics:

(vii) enrolment ratios by parental socio-economic characteristics broken down by educational level, age, sex and I.Q. (1);

(viii) transition ratios (including entry and exit by occupation) by parental socio-economic characteristics, educational level, age, sex and I.Q.; some aggregate measures can be constructed on the basis of a matrix of transition ratios e.g. expected number of years of education (2).

(ix) local and central government and private current expenditure per child per annum and cumulated over the formal school cycle by parental socio-economic characteristics, sex and region;

(x) distribution of subsidies by family income of students. "Subsidies" include both grants and benefits derived from lower-than-market interest rates or amortisation terms;

(xi) achievement scores by parental social characteristic, age, sex and I.Q. There are many types of achievement score, and the relevant one must be decided in each specific national context. This indicator can be constructed both as a stock and a flow measure. It is probably useful to have information annually.

15. With all its inherent defects as a measure of human potential, I.Q. is a useful control variable in this context, for it shows clearly that differences in "intelligence" between social classes are insignificant compared to the inequality in access to education.

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(1) The distinction rural/urban is sometimes used in addition to these characteristics. We believe that all important inequalities can be explained by the characteristics already included, but if the rural/urban distinction is known to be important it should of course be included.

(2) For a detailed description of aggregate measures based on a matrix of transition ratios, see T. Thonstad, Education and Manpower: Theoretical Models and Empirical Applications, Oliver and Boyd, London 1969.

III. The Contribution of Education to Meeting the Needs of the Economy

16. Industrial societies place considerable emphasis on the contribution which education is able to make to economic development. Much effort has been made to estimate the relationship between education and economic development (1).

17. In order to measure the contribution of education in this respect the following indicators are proposed:

(xii) distribution of the labour force by occupation, economic sector, education level and years completed, age and sex. For some countries it would probably be useful to have immigrants as a separate group. This information is probably needed every five or ten years (see footnote 3 page 3);

(xiii) amount of on-the-job training given annually to the labour force by occupation, formal education and industry, broken down by age and sex (2). "Amount" can be measured either by the number of persons, amount of time or resources;

(xiv) unemployment by type of education, occupation, age and sex (3).
This indicator should be used with caution because in advanced countries without a long-term structural unemployment problem there is danger of over-reaction to short-term increases in educated unemployment which may indicate the need for an adjustment in economic policy and not in the education system. Over-production of particular skills will usually be reflected in upgrading of certification requirements for lower grade jobs rather than in unemployment. The situation can of course be very different in developing countries.

(xv) Social and private rates-of-return on education and benefit-cost ratios by sex, type and number of years of schooling, specifying graduates and non-graduates as separate categories.

18. The social rate-of-return on education is the rate of discount which equalises the present value of the benefits

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(1) For a review of the most important work see M. Blaug, An Introduction to the Economics of Education, A. Lane, London, 1970.

(2) For a discussion of the problems in constructing this indicator see J. Mincer, "On the Job Training; Costs, Returns and Some Implications", Journal of Political Economy, Supplement, October, 1962.

(3) Information on labour vacancies by education is exceedingly difficult to obtain, because the concept of vacancy is a subjective one and perhaps more important because different educational backgrounds are suitable for a given job.

(gross lifetime earnings due to education)(1) and the present value of costs incurred (income foregone plus total current costs of educational institutions). The private rate-of-return is derived in the same way but we have to deduct taxes from gross income and deduct all costs not borne by the individual from the sum of income foregone plus total current cost of institutions (2). The interpretation of these indicators is a rather controversial issue (3).

19. Benefit-cost ratios are used to rank the desirability of investment options. The numerator is discounted benefits of earnings attributable to education, the denominator is present costs of education (including earnings foregone). In this case the rate of discount is an exogenous factor and is not derived from the calculation (as is the case in rate-of-return analysis) (4). The choice of the rate of discount is the hub of the matter and will remain a controversial issue (5).

20. The necessary data for rate-of-return and benefit-cost include a representative sample of earnings by age, sex, type and number of years of education completed, and current unit costs by type of education and for each year of completed education. Current unit costs consist of wages and salaries of personnel, imputed costs for use of capital and other current costs (electricity, cleaning, library services, raw materials, etc.). Data will be needed annually.

21. Different measures have been proposed or used in the literature to define quality of the labour force; the choice of which one to use must be dictated to some extent by the availability of data. The Working Group proposes the simplest, which probably is:

average (or median) level of education and the distribution in terms of standard school-years, embodied in the labour force between 15 and 65 years of age;

This indicator can be derived from (ii) which gives the same information for the whole population.

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(1) In calculating economic benefits of education as represented by life-time income, it is assumed that the influence of other factors like social class, education and income of parents and own personal resources have already been taken into account.

(2) G.S. Becker, Human Capital, N.B.E.R., Columbia University Press, New York, 1964.

(3) See M. Blaug, "The rate of return to investment in education", Economics of Education I, Penguin Modern Economics Series, 1968.

(4) For an example of its use in education, see C. Selby Smith, The Costs of Further Education, The Pergamon Press, London 1970.

(5) See W.J. Baumol, "The Social Rate of Discount", American Economic Review, September, 1968.

22. It is desirable to have some idea of the efficiency of informational feed-backs from the labour market to the educational system. One crude measure might be the time-lag between changes in wage-differentials and subsequent changes in the distribution of students by type and field of study. More work on this problem is needed before it is possible to propose a specific indicator.

IV. Contribution of the Educational System to Individual Development

23. Three different aspects can probably be usefully included under this heading:

(a) satisfaction of private demand for education;

(b) satisfaction of requirements for individual development;

(c) amelioration of the quality of life.

24. The most straightforward indicator of (a) is probably:

(xvi) the ratio of the number of applicants (eliminating the effect of multiple applications) to the number of places in different types of school by sex, region, and relevant social characteristic.

25. In connection with this indicator it needs to be stressed that the ability to satisfy any demand for scarce resources, like the availability of education, cannot be considered separately from the "price" clients will have to pay for their education. If all the costs connected with a certain type of education (public and private expenditure and opportunity costs) were borne entirely by society, the price for the individual (apart from psychic costs) would be zero and the demand enormous (1). It is very unlikely that it would be possible to satisfy demand in such a situation and thus would most probably not be regarded as a social goal. If however the individual bears some of the costs, e.g. the opportunity costs, potential demand may be reduced to dimensions where it is possible to satisfy it and therefore accept it as an objective. Thus it is implicitly assumed when proposing an indicator such as (a) that a consensus has been reached on the division of costs between the beneficiaries of education and the rest of society, i.e. the price of education for the client.

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(1) One of the reasons why equality of educational opportunity is frustrated is that the lower income groups have to pay a much higher "price" for education relative to their incomes than people in the higher income brackets.

26. An additional difficulty with such a measure is that systems which are completely open at the entrance stage may in fact be relatively closed due to examinations with high failure rates at later stages in the cycle. In that case the indicator has to be evaluated at that point and not at the official start of the training cycle.

27. In connection with (b), possible indicators are:

(xvii) quality of teaching, measured by the proportion of teachers who meet official training requirements, by level and type of education;

(xviii) distribution of pupils by class size by educational type and level;

Other indicators of the same type, but more directly related to individual requirements, may be:

(xix) number of hours per year available for individual counselling by level and type of education;

(xx) proportion of total staff hours represented by people with specialized insight, i.e. educational psychologists social workers, etc.

28. Indicators reflecting other dimensions of individual development are:

(xxi) proportion of educational expenditure by age group spent on handicapped students compared with the proportion of handicapped students in each group;

(xxii) the impact of education on the cognitive and affective development of the individual (1).

29. It is important to get some idea of the degree of choice which the educational system offers to pupils. A basic idea, therefore, is that of "flexibility" of educational paths. Flexibility is a multi-dimensional concept and simple measures may be misleading. A graphic presentation of the network of options in the educational system combined with a description of the degree of selectivity at transition points would tell us more about the degree of flexibility than any single simple measure. One proxy might be:

(xxiii) total number of feasible combinations of subject options, and proportion of combinations which do not preclude entry to next educational level or to other types of education on the same level.

Other useful indicators are:

(xxiv) proportion of repeaters and drop-outs by level and type of education, age, sex and social characteristic;

(1) Formidable difficulties have to be surmounted in order to measure this impact. It should therefore be regarded more as a useful concept than as a statistical measure.

(xxv) possibilities for part-time work by type and level of education, measured by the proportion of students engaged in part-time work;

(xxvi) proportion of the adult population which voluntarily enrols for adult education courses;

(xxvii) value of time spent by adults on educational activities during hours of leisure (time budget studies).

30. In connection with the quality of life, one basic consideration would probably be education's contribution to health. By education's contribution, we do not mean the output of doctors, nurses, etc. (which is really education's contribution to the health industry rather than to health itself) but the impact of knowledge obtained in the educational process on the health of the population in general. In fact it is only recently that statistical measures of the state of health have been explored. In Member countries of the O.E.C.D., simple measures such as life expectancy are not too useful since life expectancy is now rather high and without much variation between countries. We are well beyond the stage when an expansion of education is likely to have significant impact on life expectancy except perhaps in some parts of Southern Europe where incomes are particularly low. More important is the possible impact of education on mental health, especially in old age. It may be that senility, like mental health in general, is related to the amount and kind of education received. The relationships need to be further explored. In this field, therefore, no indicator is suggested; it is simply mentioned as an important area for research.

31. The ability of individuals to lead a varied and active life is one of the main benefits accruing from the educational system. This is extremely difficult to measure objectively, but the major socially-provided opportunity to be active in life is participation in the labour force. Numerous studies have shown that labour force participation of men over their life cycle is not significantly influenced by differences in their education, but the situation is quite different for women. Female labour force participation is much lower for those with only primary education than it is for women with upper secondary and higher education. Increased education for women will therefore lead to important social benefits, especially for the middle aged, who with only a primary school background may feel unable to join the labour force, or even to enrol in a training course which would make this possible. Therefore:

(xxviii) labour force participation by sex, level and type of education, and relevant social characteristic,

seems an appropriate indicator here.

32. In proposing statistical measures of cultural activity it is difficult to avoid assumptions which imply elitist values. Such assumptions are evident if the performing arts and literature are the only cultural activities included. One distinction between different uses of leisure

which may avoid this problem of elitist assumptions is that between active and passive uses of leisure, more particularly in the field of recreation, between participant and spectator sport. Hence:

(xxix) participation in cultural activities by level and type of education allowing for other important factors

is listed as a possible indicator, but it obviously needs more careful specification.

V. The Contribution of Education to the Transmission and Evolution of Values

33. Transmission of values is an important function of the educational system. Many countries consciously use or have used the educational system to shape particular values and beliefs. But how can the content of these values be charted or measured ? And if they can be specified, how far can their prevalence be attributed to the actions of the educational system ?

34. Some of the existing values are accepted because of the educational system, some in spite of it, and in some cases there may be no relationship at all. And we should expect the educational system to be as much influenced by these values as to be influencing them.

35. The literature of social diagnosis is vast, but hard data are scarce, and there is no obvious operational basis for useful indicators. The Group has therefore drawn the conclusion that at present there are no indicators available which would show the performance of the educational system in contributing to prevailaing values. However, there is need for more work in this area, which many consider basic to the education system.

VI. Effective Use of Resources in Pursuit of the Above Policy Objectives

36. It is almost self-evident that any social system, based upon utilisation of scarce resources, i.e. resources with alternative uses, should attain its policy objectives at least cost. In view of the different goal structures of educational systems in the Member countries, and the intricate relationship between inputs of resources and the outcome in the field of education, it is not possible at this stage to propose any indicator of efficiency. However, a necessary condition for efficient use of resources is increased knowledge about the internal functioning of the system and its relation to society. This insight can only be created by research and scientific analysis of the system. The importance of research can be measured in different ways. The proposed measure is very simple and straightforward:

(xxx) the proportion of total private and public expenditure allocated to educational research.

37. Resources available as inputs to the educational process may be divided into two different categories:

(a) instrumental inputs which can be manipulated within and by the educational system;

(b) exogenous inputs which the educational system must regard as given and which are determined outside the system.

38. The borderline between these two categories is not a sharp one, for it is easy to find examples of input factors which are partly instrumental and partly exogenous. One obvious example is teachers' wages, which are partly determined by the general level of productivity but also by the demand for teachers from the educational system.

39. Instrumental and exogenous inputs influence the educational process simultaneously. Thus, in order to estimate the effect of changes in the educational output of changes in instrumental inputs such as teachers' wages, the effect of exogenous inputs must be taken into account. Information on both types of inputs is therefore needed for realistic estimates of the results of policy changes.

40. Instrumental inputs include:

(a) teacher time;

(b) quality of teaching;

(c) student time;

(d) equipment, books and buildings.

(e) Although implicit in the preceding four types of input, the following deserve explicit mention;

ways of organising instruction, e.g. t.v. instruction for large groups versus the usual class-room instruction, etc.

Each of these points will have to be discussed in some detail to arrive at the specific measures proposed.

41. The following statistics are needed on the input of teacher time:

(xxxi) number of teachers by type and level of schools in which they teach, broken down by sex, age, type and level of own education;

(xxxii) working hours, i.e. required number of working hours and overtime per year by sex, age and type and level of teacher's education, and by type and level of school in which they teach;

(xxxiii) average size of class by level and type of education.

42. The quantity of the teacher inputs is here measured by the input of working hours, while their quality is measured by the level and type of education of teachers. The latter is the traditional way of measuring quality, although recent research has cast considerable doubt on this variable, as it has in fact for all inputs of school resources (1). Some studies suggest that teachers' verbal ability, recentness of education and experience with the particular socio-economic groups being taught are more relevant measures of quality than the measures proposed above. However, these results are still controversial, and the more traditional definition of quality does reflect resource use because teacher pay generally varies by level of their education, age or years of teaching experience.

43. The rapid advance in the body of total knowledge and the new insight continually gained through research on education, makes it necessary for teachers to have access to recurrent education, if only to keep the quality and relevance of their teaching intact. Thus, as measures in connection with(b), the Working Group proposes:

proportion of teachers fulfilling official training requirements, by level and type of education (same as (xvii)

(xxxiv) number of hours per teacher per year allocated to organised recurrent education.

44. Other important instrumental inputs are those referred to under (c) and (d):

(xxxv) number of school-hours per student per year by type and level of education. This is a very important factor especially because at levels above the primary school it is probably the single most important input in terms of opportunity cost. It will also be necessary to have data on wages which will permit an estimate of earnings foregone by pupils in secondary and higher education (2).

(1) J.S. Coleman and Associates, Equality of Educational Opportunity, U.S. Department of Health, Education and Welfare, Washington, D.C. 1967.

(2) Dividing this statistic by the product of the required number of working hours per teacher and class size we obtain the teacher/pupil ratio.

(xxxvi) other current costs including expenditure on teaching materials, cleaning, electricity, transportation and imputed user costs of existing capital, especially buildings, by level and type of education;

(xxxvii) investment costs, buildings and equipment by type and level of education.

(xxxviii) current costs per pupil of different educational technologies.

45. The second category of inputs are exogenous inputs, which can be divided into three sub-categories:

(a) factors describing personal and family resources which influence the education and educability of the school population;

(b) factors describing peer group influences within the school population;

(c) the value of the input of teacher time and pupil time.

46. Actual measures relating to those three sub-areas might be:

(xxxix) initial distribution of achievement scores of pupils by level and type of education.

(xxxx) distribution of pupils by fathers' and mothers' education, family income, and fathers' and mothers' occupation;

(xxxxi) distribution of individual schools, showing average social class of pupils. The study by J.S. Coleman and Associates, Op. cit., indicates that the higher the average social class of the peer group, the better is individual performance. Of course, not everyone can be in a group of high average social class, and since peer group influences appear to be stronger on pupil of lower social classes, it is not clear what constitutes an optimal distribution of pupils between schools;

(xxxxii) weekly or hourly pay for teachers by age, sex and educational level, by level and type of school;

(xxxxiii) weekly or hourly wage for young workers, by sex, education and age. This information is needed to estimate the opportunity cost of the input of student time.

47. Variations in methods of financing (1) can have considerable influence on the allocation of resources and the distribution of the benefits of education. Financial instruments can influence the educational system in four ways by affecting the:

(a) price and use of inputs;

(b) benefits derived from education;

(c) demand for education;

(d) participation of social groups in the educational system.

48. An example of (a) is the case where there is government support for either private or local government education. This support is often in specific form, e.g. payment of teachers' wages, and this may affect the use of resources by local authorities. In the case of (b) it is clear that the bigger the financial burden assumed by individuals, the smaller will be their benefits in terms of life-time earnings. This, in turn, will have an impact on the demand for education (c).

49. The degree of subsidisation of education costs by the State and the extent to which maintenance grants are available for students will obviously have an impact on the extent to which different social classes participate in education beyond the compulsory stage (d).

50. Due to these reasons, as well as the need for accounting and budgeting control, it is obvious that financial statistics have a natural place in an information system for education. The following statistics are probably necessary:

(xxxxiv) the proportions of total direct expenditure financed from private sources, local authorities and central government, for each level and type of education;

(xxxxv) Central government subsidies to local government and private schools by method of support for each level and type of education.

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(1) See R.W. Hartman, Credit for College, Carnegie Commission on Higher Education, Berkeley, 1971; M. Blaug, Introduction to the Economics of Education, Chapter 10, A.Lane, London, 1970; L. Hansen and B. Weisbrod, Benefits, Costs and Finance of Public Higher Education, Markham, New York, 1969; M. Woodhall, Student Loans: A Review of Scandinavia and Elsewhere, Institute of Education, London, 1970; L. Reifman, ed., Financing of Education for Economic Growth, O.E.C.D., Paris, 1966.

(xxxxvi) subsidies, loans and grants to individuals, by type and level of education, and parental social characteristic.

51. The reason for including (xxxxv) as a statistic on methods of financing is that government subsidies are often not neutral as to the allocation of inputs, and thus may lead to a more extensive utilization than intended for certain inputs. An example is government support for local schools based on teachers' wages, which reduces the wage of teachers for local authorities, and this leads to a more extensive use of teachers than in a situation where support is neutral with regard to inputs.